

Traceable Calorimetric Measurements of Large Radioactive Waste Packages

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The control and characterization of radioactive waste packages coming from the decommissioning of nuclear facilities are a great concern for the management of the repository sites dedicated to these specific wastes. One of the key parameters, in particular for the underground installations, is the control of the thermal power released by the radioactive waste packages. Once they are stored deep underground, they can cause an increase of the surrounding rock temperature that could induce a modification of its containment capabilities over time. It is thus essential to accurately know the thermal activity of waste packages in order to select the suitable storage mode, and to ensure that wastes comply with the requirements defined by the safety authorities in term of thermal power. The French National Agency of Radioactive Waste Management (Andra), which is in charge of all the tasks related to radioactive waste management in France, needs to measure the thermal power of these wastes (with an uncertainty lower than 5 %) by using a reliable measurement method that is traceable to the international system of units (SI). In the framework of the European project “Metrology for decommissioning nuclear facilities”, LNE and Andra work in the development of two prototypes of calorimeter in order to accurately measure the thermal power (up to 500 W) of real size radioactive waste packages. The selected metrological approaches are based on the principles of air circulation calorimeter and heat-flux calorimeter. This paper describes in details the calorimeter prototypes as well as the design of radioactive waste package simulators. First results obtained on the calibration of the calorimeters and on the determination of the thermal powers are presented.

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